

2nd Fundamental Theorem of Calculus
AB CALCULUS

Name _____

Find the derivative of each function $g(x)$.

1. $g(x) = \int_0^x f(t) dt$

2. $g(x) = \int_x^0 f(t) dt$

3. $g(x) = \int_{24}^{h(x)} f(t) dt$

4. $g(x) = \int_{m(x)}^{k(x)} f(t) dt$

5. $g(x) = \int_{3x^2}^0 \sin 2t dt$

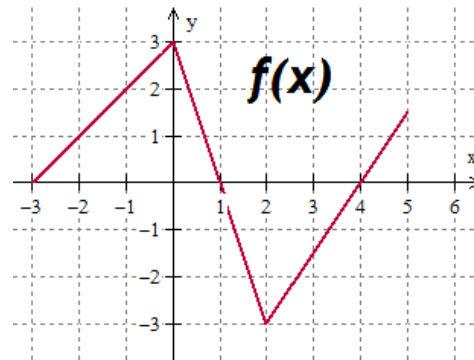
6. $g(x) = \int_{5x-1}^2 (2t-1)^2 dt$

Use the graph of f at the right to answer each.

Let $g(x) = \int_0^x f(t) dt$, $h(x) = \int_0^{2x} f(t) dt$, $r(x) = \int_{-x}^5 f(t) dt$

Find each.

7. $g(4)$ and $g(-3)$
8. $h(1)$ and $h(-1)$
9. $r(2)$ and $r(-2)$
10. $g'(2)$
11. $h'(2)$
12. $r'(2)$
13. $g''(2)$
14. $h''(2)$
15. $r''(2)$



Multiple Choice

16. If $f(x) = \int_1^{x^2} \frac{t^3+1}{t^2+1} dt$, find $f'(x)$.

- a. $2x(x^6+1)\arctan x$
- b. $\frac{x^6+1}{x^4+1}$
- c. $\frac{x^3+1}{x^2+1}$
- d. $2x\left(\frac{x^6+1}{x^4+1}\right)$
- e. $2x\left(\frac{x^3+1}{x^2+1}\right)$

17. If $g(x) = \int_x^{x^2} \cos^3 t dt$, find $g'(x)$.

- a. $\frac{\sin^4 x^2}{4} - \frac{\sin^4 x}{4}$
- b. $2x \cos^3 x$
- c. $\cos^3 x^2 - \cos^3 x$
- d. $2x \sin^4 x - \sin^4 x^2$
- e. $2x \cos^3 x^2 - \cos^3 x$

18. Let $B(x) = \int_0^{2x^2-x+1} \sqrt{t^2+1} dt$. Which of the following statements is true?

- a. B has a relative maximum at $x = \frac{1}{4}$.
- b. B has no relative max or min.
- c. B has a relative minimum at $x = 1$.
- d. B has a relative minimum at $x = \frac{1}{4}$.
- e. B has a relative maximum at $x = 1$.

ANSWERS

1. $g' = f(x)$
2. $g' = -f(x)$
3. $g' = f(h(x)) \cdot h'(x)$
4. $g' = f(k(x)) \cdot k'(x) - f(m(x)) \cdot m'(x)$
5. $g' = -6x \sin(6x^2)$
6. $g' = -500x^2 + 300x - 45$
7. -3, -4.5
8. 0, -4
9. 1.75, -2.25
10. -3
11. 0
12. 1
13. dne!
14. 6
15. -1
16. d
17. e
18. d